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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|--|-------------|----------------------|----------------------------|------------------------|
| 10/829,611 | 04/22/2004 | Shyh-Lin Tsao | DEE-PT168 | 6851 |
| 3624 7590 05/16/2007 VOLPE AND KOENIG, P.C. UNITED PLAZA, SUITE 1600 30 SOUTH 17TH STREET PHILADELPHIA, PA 19103 | | | EXAMINER DOAN, JENNIFER | |
| | | | ART UNIT 2874 | PAPER NUMBER |
| | | | MAIL DATE 05/16/2007 | DELIVERY MODE PAPER |

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

| | | | | |
|------------------------------|-----------------|--|--------------|--|
| Office Action Summary | Application No. | | Applicant(s) | |
| | 10/829,611 | | TSAO ET AL | |
| | Examiner | | Art Unit | |
| | Jennifer Doan | | 2874 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 April 2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-35 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 21-35 is/are allowed.
- 6) ☒ Claim(s) 1-7, 11-14, 19 and 20 is/are rejected.
- 7) ☒ Claim(s) 8-10 and 15-18 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>042204</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Information Disclosure Statement

2. The prior art documents submitted by applicant in the Information Disclosure Statement filed on 04/22/04, have all been considered and made of record (note the attached copy of form PTO-1449).

Drawings

3. The drawings, filed on 04/22/04, are accepted.

Specification

4. Applicants' cooperation is requested in correcting any errors of which applicants may become aware in the specification.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claims 1-7, 11-14, 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Eldada et al. (U.S. 6,438,293) in view of Kondo (JP 63-76391).

With respect to claim 1, Eldada et al. (figures 1 and 4A) disclose a tunable optical add-drop multiplexer (OADM) based on an SOI (silicon-on-insulator) wafer, comprising a multimode interference region (2); at least a grating (4) formed on the multimode interference region (2); and electrode (8) formed on the multimode interference region (2) and having carriers induced thereinto, thereby a variation of an optical waveguide in the grating (4) is controlled through controlling the carriers induced into the electrodes so as to further control different propagation of wavelength signals (column 3, line 57-column 4, line 53).

Eldada et al. do not explicitly disclose two electrodes formed two sides of the multimode interference region.

However, Kondo (figure 1a) teaches a device having two electrodes (7 and 8) formed two sides of the multimode interference region (see figure 1a). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device of Eldada with the two electrodes formed two sides of the multimode interference region (accordance with the teaching of Kondo) for the purpose of varying the wavelength of reflected light to provide for more efficient control the wavelength of light.

With respect to claim 2, Eldada et al. (figure 4A) disclose the optical add-drop multiplexer, further comprising at least an input port (22) formed on one of said two sides of said multimode interference region (2) for receiving multiple wavelength signals.

With respect to claim 3, Eldada et al. (figure 4A) disclose the optical add-drop multiplexer, further comprising at least a drop port (24) formed on one of said two sides of said multimode interference region (2) for gathering a portion of said wavelength signals.

With respect to claim 4, Eldada et al. (figure 4A) disclose the optical add-drop multiplexer, further comprising at least an add port (28) formed on the other said side of said multimode interference region (2) for adding at least a signal having a random wavelength.

With respect to claim 5, Eldada et al. (figure 4A) disclose the optical add-drop multiplexer, further comprising at least an output port (26) formed on the other said side

of said multimode interference region (2) for outputting a non-gathered portion of said wavelength signals and said signal having a random wavelength.

With respect to claim 6, Eldada et al. (figure 1) disclose the optical add-drop multiplexer, wherein said grating (4) is a Bragg grating (column 4, lines 2-3).

With respect to claim 7, Eldada et al. disclose the optical add-drop multiplexer, wherein said grating varies a refractive index thereof so that an wavelength signal passing therethrough has a tunable wavelength due to an involved said index (see the abstract).

With respect to claim 11, Eldada et al. disclose the optical add-drop multiplexer, wherein said multimode interference region has a variable cross section so that a variation of a corresponding gathered wavelength is presented after said carriers are controlled by different voltages (see figures 1 and 2).

With respect to claim 12, Eldada et al. disclose the optical add-drop multiplexer, wherein said multimode interference region has a tunable length and a tunable width for adjusting a wavelength response of the interference so as to adjust a position of an initial central wavelength (see table 1 and column 5, line 50 – column 6, line 4).

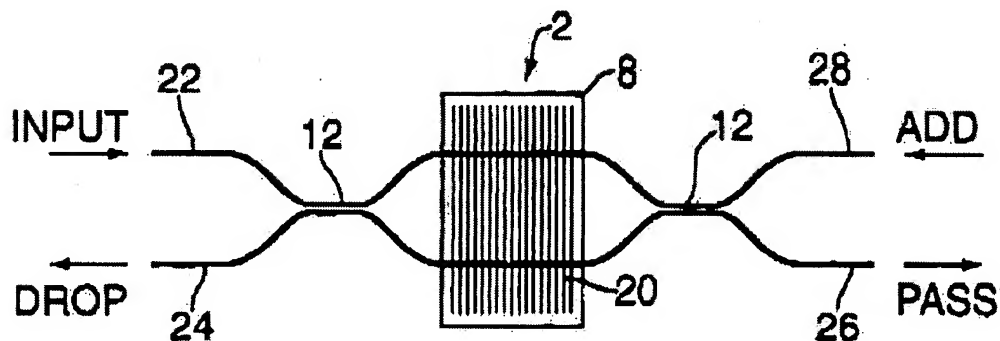
With respect to claims 13 and 14, Eldada et al. disclose the optical add-drop multiplexer, wherein said electrodes are changed in structure and/or in dimension so that a current of said carriers has a different injecting efficiency into said electrodes so as to control a speed of adding and dropping a wavelength and wherein said electrodes are electroplated by different materials so that a current of said carriers has a different injecting efficiency into said electrodes, and thereby a power variation of a

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corresponding gathered wavelength is controlled by a variation of a refractive index of said grating so as to design different central wavelength responses (column 6, lines 25-44).

With respect to claim 19, Eldada et al. disclose the optical add-drop multiplexer, wherein plural 2×2 said wavelength tunable optical add-drop multiplexers based on said SOI wafer are combined to make an $N \times N$ Benes optical switch (see figure 8).

With respect to claim 20, Eldada et al. disclose the optical add-drop multiplexer, wherein 2×2 said wavelength tunable optical add-drop multiplexers based on said SOI wafer are combined in a multilayered sub-matrix arrangement so as to make an $N \times N$ MDB switch (see figure 8).



Allowable Subject Matter

8. Claims 8-10 and 15-18 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The prior art fails to disclose or reasonably suggest the optical add-drop multiplexer, wherein said grating is structurally changed through arranging identical grating periods so as to control a wavelength response as recited in claims 8 and 9; wherein said grating is changed in wavelength response through altering a height thereof so as to add or drop different said wavelength signals as recited in claim 10; wherein an instantaneous variation of an index of said grating is achieved through instantaneously inputting different voltages for controlling a power variation of a corresponding gathered wavelength so as to achieve an instantaneous exchange of wavelengths as recited in claim 15; wherein a gathering of said wavelength signals is controlled through operating different instantaneous voltages as recited in claim 16; wherein said electrodes are sectionalized and supplied by different voltages for simultaneously gathering different wavelength signals as recited in claim 17 and further wherein when a number of both said output and input ports are N, an optical wavelength exchanging switch with N x N ports is obtained through a serial connection there among by using a module arrangement, and, through being supplied different voltages and having multi-sectional electrodes, said optical wavelength exchanging switch simultaneously gathers different wavelength signals as recited in claim 18.

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9. Claims 21-35 are allowed.

The prior art fails to disclose or reasonably suggest a method for manufacturing a wavelength tunable optical add-drop multiplexer based on a semiconductor wafer, comprising steps of forming an insulating layer and a conducting layer on said substrate; and defining a multimode interference region and plural input/output waveguides on said conducting layer in combination with the other limitations of claim 21.

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer Doan whose telephone number is (571) 272-2346. The examiner can normally be reached on Monday to Thursday from 6:00am to 3:30pm, second Friday off.

11. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rodney Bovernick can be reached on (571) 272-2344. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

12. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JD

May 9, 2007

Jennifer Doan
JENNIFER DOAN
PRIMARY EXAMINER